

5 CLAIMS

I claim:

1. An analog input module for a controller, said analog input module comprising:
  - an analog-to-digital converter having an input and an output thereof; and
  - 10 an input circuit comprising an output terminal connected to said input of said analog-to-digital converter, a voltage input terminal, a current input terminal, and a common terminal; said input circuit configured to accept a voltage input between said voltage input terminal and said common terminal, accept a current input between said current input terminal and said common terminal, and provide an output voltage at said output terminal dependent upon either said voltage input or said current input without switching therebetween.
2. The analog input module according to claim 1, wherein:
  - 15 said input circuit comprises first, second and third resistors, each of said resistors arranged in series with one another;
  - 20 each of said first, second and third resistors having a first end and a second end; said voltage input terminal connected to said first end of said first resistor; said current input terminal connected to said second end of said second resistor and to said first end of said third resistor;
  - 25 said common terminal connected to said second end of said third resistor; and said output terminal connected to said second end of said first resistor and to said first end of said second resistor.

3. The analog input module according to claim 2, further comprising:
  - a voltage supply rail;
  - a first diode connected between said voltage supply rail and said input of said analog-to-digital converter so as to allow current flow only from said input of said analog-to-digital converter to said voltage supply rail; and
  - a second diode connected between said input of said analog-to-digital converter and a ground so as to allow current flow only from said ground to said input of said analog-to-digital converter;

wherein said first and second diodes limit an input voltage applied to said input of said analog-to-digital converter.

15  
10  
20  
25

4. The analog input module according to claim 3, further comprising:
  - an optical isolator connected to said output of said analog-to-digital converter;
  - a microcontroller connected to said optical isolator.
5. The analog input module according to claim 1, further comprising:
  - an optical isolator connected to said output of said analog-to-digital converter;
  - a microcontroller connected to said optical isolator.
6. An input circuit for an analog input module, said input circuit comprising:
  - a voltage input terminal;
  - a current input terminal;
  - a common terminal; and
  - an output terminal;

said input circuit configured to accept a voltage input between said voltage input terminal and said common terminal, accept a current input between said current input terminal and said common terminal, and provide an output voltage at said output terminal dependent upon either said voltage input or said current input without switching therebetween.

10 7. The input circuit according to claim 6, further comprising:

first, second and third resistors, each of said resistors arranged in series with one another;

each of said first, second and third resistors having a first end and a second end;

said voltage input terminal connected to said first end of said first resistor;

15 said current input terminal connected to said second end of said second resistor and to said first end of said third resistor;

said common terminal connected to said second end of said third resistor; and

20 said output terminal connected to said second end of said first resistor and to said first end of said second resistor.

8. The input circuit according to claim 7, further comprising:

a voltage supply rail;

a first diode connected between said voltage supply rail and said output terminal so as to allow current flow only from said output terminal to said voltage supply rail; and

25 a second diode connected between said output terminal and a ground so as to allow current flow only from said ground to said output terminal;

wherein said first and second diodes limit said output voltage at said output terminal.

9. An analog input module for a controller, said analog input module comprising:  
means for processing signals from external means for sensing;  
means for converting said signals from analog to digital form; and  
an output of said means for processing signals connected to said means for converting

10 said signals from analog to digital form;

wherein said means for processing signals is provided with voltage input means,  
current input means, and signal return means;

15 said means for processing signals includes means for accepting a voltage input  
between said voltage input means and said signal return means, means for accepting a current  
input between said current input means and said signal return means, and means for providing  
an output voltage at said output means dependent upon either said voltage input or said  
current input without switching therebetween.

10. The analog input module according to claim 9, wherein:

20 said means for processing signals comprises first, second and third impedance means,  
each of said impedance means arranged in series with one another;  
each of said first, second and third impedance means having a first end and a second  
end;

said voltage input means connected to said first end of said first impedance means;

said current input means connected to said second end of said second impedance

25 means and to said first end of said third impedance means;

said signal return means connected to said second end of said third impedance means;

and said output of said means for processing said signals connected to said second end of said first impedance means and to said first end of said second impedance means.

11. The analog input module according to claim 10, further comprising:

means for supplying a voltage;

10 first clamping means connected between said means for supplying a voltage and said input of said means for converting signals from analog to digital form so as to allow current flow only from said input of said means for converting signals from analog to digital form to said means for supplying a voltage; and

second clamping means connected between said input of said means for converting signals from analog to digital form and a ground so as to allow current flow only from said ground to said input of said means for converting signals from analog to digital form;

wherein said first and second clamping means limit an input voltage applied to said means for converting signals from analog to digital form.

12. The analog input module according to claim 11, further comprising:

20 means for providing optical isolation connected to said output of said means for converting signals from analog to digital form;

a microcontroller connected to said means for providing optical isolation.

13. An apparatus for processing signals from external sensors for an analog input module, said apparatus comprising:

25 voltage input means;

current input means;

signal return means;

output means;

means for accepting a voltage input between said voltage input means and said signal

return means;

10 means for accepting a current input between said current input means and said signal  
return means; and

means for providing an output voltage at said output means dependent upon either  
said voltage input or said current input without switching therebetween.

14. The means for processing signals according to claim 13, further comprising:

first, second and third impedance means, each of said impedance means arranged in  
series with one another;

each of said first, second and third impedance means having a first end and a second  
end;

said voltage input means connected to said first end of said first impedance means;

20 said current input means connected to said second end of said second impedance  
means and to said first end of said third impedance means;

said signal return means connected to said second end of said third impedance means;

and

said output means connected to said second end of said first impedance means and to

25 said first end of said second impedance means.

15. The means for processing signals according to claim 14, further comprising:

means for supplying a voltage;

first clamping means connected between said means for supplying a voltage and said output means so as to allow current flow only from said output means to said means for supplying a voltage; and

10 a second clamping means connected between said output means and a ground so as to allow current flow only from said ground to said output means;  
wherein said first and second clamping means limit an output voltage at said output means.

10404224 2006-03-06